THE ONTARIO WATER RESOURCES COMMISSION

INDUSTRIAL WASTE SURVEY

TOWN OF BRAMPTON

1961

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A report on the investigation of waste waters discharged by industries in the Town of Brampton to the municipal sewage system.

by

R. C. Stewart

Industrial Wastes Branch

Ontario Water Resources Commission

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INTRODUCTION

An industrial waste survey was conducted in the town of Brampton by the Industrial Wastes Branch of the Ontario Water Resources Commission. The field work for this survey was carried out between April and June 1961.

The purpose of the investigation was to estimate the sewer loading, along with the strength, characteristics and volume of wastes discharged by industries to the two sewage treatment plants in the Brampton area. The information collected was that which was thought to be necessary for the design of an extension of the sewage treatment plant built and operated at Brampton by the Ontario Water Resources Commission.

This plant is an activated sludge plant located on the Second Line East, between Base Line Road and Derry Road. The old sewage treatment plant, also an activated sludge plant, is located on Main Street South, south of Harold Street.

METHOD OF CONDUCTING THE SURVEY

Previous work by the Industrial Waste Branch in the town of Brampton was limited mainly to three industries, Brampton Poultry Company Limited, Gerry Lewis Limited, and Union Screen Plate Company of Canada Limited. The initial industrial survey of Brampton covered six industries in 1957. Since that time many new industries have located in Brampton. These new industries and some of the older industries had never been surveyed by the Industrial Waste Branch.

To begin the present survey, Mr. G. W. Nantel, the Commissioner of Works for the town of Brampton, provided a list of the industries in Brampton. The water consumption for each of these industries was then obtained from the Brampton Water Commission. All industries that were known orbelieved to beoperating wet processes were investigated. Of the total sixty industries in Brampton, thirty-five were visited and individual reports on fourteen of these are included in this report. In addition to the fourteen reported industries, seven were found that sewered small amounts of cooling water, and four industries discharged small volumes of industrial wash water that amounted to less than 2,000 gallons per day. All other industries discharged only sanitary wastes to the municipal sewerage system.

Mr. L. Crowdis, the engineer for Bramalea sub-division revealed that two industries were in partial operation, and two others will be building shortly in this sub-division. Bramalea has its own water supply, but its sanitary sewers are connected to the Brampton

Method of Conducting the Survey (cont'd.)

sewerage system. Of the industries in operation, one is a warehouse operation, and the other will have an extensive plating operation with complete waste treatment when the plant is finished. As yet the plating facilities have not been installed.

INTERPRETATION OF ANALYTICAL RESULTS

The analyses performed on samples collected during this survey are listed below. A brief description of each test is included as an aid in interpreting the analytical results.

Acidity - The acidity of a waste stream is usually caused by small amounts of carbonic acid in equilibrium with free carbon dioxide, mineral acids and salts of strong acids and weak bases. The presence of acidity in fresh domestic sewage indicates an acidic industrial waste.

Alkalinity - Most natural waters are usually alkaline because of the presence of bicarbonate, carbonate and hydroxide components. Industrial discharges high in alkalinity can affect the hardness of the receiving stream, and if "caustic" alkalinity is present, they can deposit calcium carbonate scale in sewers. Both acidity and alkalinity are reported as parts per million of calcium carbonate.

Biochemical Oxygen Demand (BOD) - This test indicates the amount of oxygen required to stabilize the decomposable organic matter in a waste in five days under standard laboratory conditions. The BOD result is commonly used for comparing the strength of industrial wastes with

Interpretation of Analytical Results (cont'd.)

that of normal sanitary sewage. This approach is limited in some cases since the BOD in many industrial wastes is not completely, nor sometimes partially, stabilized in 5-days.

Cyanide - When cyanides are present in sewage or surface waters, industrial pollution is present. Cyanides are probably the most toxic component of industrial wastes. It has been reported that fish can not live indefinitely in water that contains as little as 0.1 parts per million cyanide ion $(CN)^-$. Low concentrations of cyanide in sewers can liberate hydrogen cyanide gas which would be especially dangerous to sewerage system workers. Because of this health hazard, cyanides should be eliminated from industrial discharges. Cyanides are reported as parts per million HCN.

Grease and Oil - Oil and grease present an offensive condition in surface water, and adversely affect the operation of a sewage treatment plant. They can coagulate, settle and block sewers. Grease and oil are determined as ether solubles.

Hydrogen Ion Concentration (pH) - The pH is the negative logarithm of the hydrogen ion concentration, and is recorded in numbers ranging from 0, which is very acidic, to 14,which is very basic. At 25°C. the neutral point is 7. While the acidity and alkalinity include the buffering action of a waste, the pH gives the instantaneous activity of the hydrogen ion. The optimium range at which a sewage treatment plant operates most efficiently is 7.8 to 8.0.

Interpretation of Analytical Results (cont'd.)

Iron - The form of iron in a waste depends on other characteristics of the sample. When the pH of the sample is below the range recommended for discharge to a natural watercourse or sewerage system, the iron is in solution. When the pH is in the recommended range, the iron is in suspension, and is detected as suspended solids.

Metallic Ions - Metallic ions such as copper, cadmium, nickel and chromium,should be limited to low concentrations for discharge to municipal sewers because they are toxic to the biological processes in a sewage treatment plant. They impede either the oxidation or digestion processes and cause problems in dewatering the sludge.

Nitrogen - The nitrogen determinations performed are free ammonia, Kjeldahl, nitrates and nitrites. The total organic nitrogen is calculated by substracting the free ammonia from the total Kjeldahl. The protein content of the waste can be estimated from the total organic nitrogen. Nitrites and nitrates are not usually found in wastes or sewage in appreciable quantities, but are present in the effluent from a biological sewage treatment plant. The nitrite and nitrate analyses indicate the degree of treatment of waste stream since free ammonia is oxidized to nitrite and then to the more stable nitrate form.

Nitrogen is necessary for the operation of a biological sewage treatment plant. It is a nutrient for the biological organisms. Sanitary sewage usually contains a biochemical oxygen demand to nitrogen, ratio of 10 to 1, but the optimim ratio for the operation of an activated

Interpretation of Analytical Results (cont'd.)

sludge sewage treatment plant is 20 to 1.

Phenol - The results are reported as phenol equivalents, including cresols and higher hydroxy derivatives of benzene that react with either Gibbs reagent or 4-aminoantipyrene. Phenol equivalents are recorded in parts per billion, and small amounts are normally acceptable in a biological sewage treatment plant.

Solids - The results from solids determinations are reported as total, suspended and dissolved solids. Suspended solids are those that float, settle or are held in suspension. Sewage and some industrial wastes are significant sources of suspended solids. The effects of suspended solids are reflected in the unsightly condition of some surface waters where solids have settled and interfere with navigation and injure the habitat of fish.

Sulphide - Sulphides are determined as H_2S. Dissolved sulphides can liberate hydrogen sulphide gas from a waste stream if the pH of the stream decreases, or if the waste stream is aerated. Hydrogen sulphide gas has the characteristic odour of rotten eggs.

WATER SUPPLY

All the industries obtained their water from the Brampton municipal system. The sources for the municipal system were drilled wells, located north and east of the town. For emergency purposes, a

Water Supply (cont'd.)

consumption, average figures were taken for as long a period as possible.

WASTE DISPOSAL

In the town of Brampton wastes were collected in sanitary and combined sewers. Wastes from the west end of the town were directed to the old sewage treatment plant on Main Street South. The overflow, or by-passed wastes from this old plant, and wastes from the eastern section of town, including Bramalea, were treated at the new sewage treatment plant on the Second Line East, between Derry West and Base Line Road. The effluents from both these plants were discharged to the west branch of Etobicoke Creek.

The old plant treated approximately 700,000 gallons per day, and the new plant 1.25 million gallons per day. However, during the day, the old and new plants were receiving wastes at the rates of 1.4 and 2 million gallons per day respectively.

The volume of industrial waste discharged by the industries amounted to 450,000 gallons per day. 420,000 gallons per day were discharged to the municipal sanitary and combined sewers, while the remainder was directed to storm drains which emptied into the east branch of Etobicoke Creek. American Motors (Canada) Limited, Strippit Tool and Machine Company Limited, and Usher Plastics Limited, discharged cooling water to storm drains, while Brampton Optical Company Limited and Mosler-Taylor Safes direct process wastes to storm drains, and Union Screen

Waste Disposal (cont'd.)

Plate Company of Canada Limited, disposed of boiler blowdown to storm drains. All other wastes were collected by the municipal sewerage system. Since most of the industries operated only one shift per day, over 80% of the industrial loading was discharged during the day shift. Thus the rate of discharge of industrial wastes to the sewage treatment plants during the day was slightly in excess of the rate of 1 million gallons per day.

Most industries discharged their wastes directly to the municipal sewerage system. Only four plants pretreated their wastes before discharging them. Brampton Optical Company Limited had facilities for settling their plant wastes; Brampton Poultry Company Limited screened part of their wastes and collected solids at locations in the plant; General Latex and Chemicals (Canada) Limited settled their wastes; and Gerry Lewis Limited passed wastes through four large settling tanks then partially chlorinated the effluent before discharging it to the town sewers.

Both sewage treatment plants serving Brampton are of the activated sludge type. They provide primary settling with digestion of the raw solids, and secondary or biological treatment. The final effluent after clarification was chlorinated and discharged to the west branch of Etobicoke Creek. The critical processes are the biological oxidation and digestion operations. These processes must be protected from materials that are detrimental to the growth and survival of the microscopic organisms responsible for the biological activity. The mechanical equipment

Waste Disposal (cont'd.)

of the sewerage system must be protected from corrosive industrial discharges, and the industrial discharges must not present a health hazard to sewerage system workers.

Brampton By-law Number 1572, regulating the use of public and private drains and sewers, provides the means for assuring the required protection for the sewerage system. This By-law has been in effect since 1956, and limits the materials and concentrations that are acceptable for discharge to municipal sewers. The By-law provides penalties of up to $200 per day against anyone convicted of violating any provision of the By-law.

SUMMARY

Slightly over one-half of the industries in Brampton were classified as dry industries. That is, they discharged only sanitary wastes. The remaining plants either discharged negligible amounts of industrial wash water (four industries), discharged only cooling water (seven industries), were not yet in operation (three industries), or are appended to this report under individual industrial reports.

All industrial water was obtained from the municipal water system, and all waste flows with the exception of five, were discharged to the municipal sewerage system. Three plants discharged cooling water, two other plants discharged process waste waters, and one plant directed boiler blowdown to storm drains that emptied into natural watercourses.

The industrial sewer loading was 575 pounds per day

Summary (cont'd.)

biochemical oxygen demand, and 1044 pounds per day suspended solids. This gave a sewered population equivalent with respect to biochemical oxygen demand of 3,440 people, and with respect to suspended solids of 5,220 people. These were approximately one-fifth and one-third the population of the town of Brampton respectively. Included in the above figures were the waste components that were discharged to storm drains. The daily industrial wastes also included 82 pounds of fat, 53 pounds of sulphide (calculated as H_2S), 9 pounds of chromium, of which 2.2 pounds were in the hexavalent state, and smaller amounts of copper, zinc, and phenol.

DISCUSSION

The fourteen industries included in this report accounted for 78% of the total volume of industrial wastes. The remaining 22% was mainly sanitary waste from the greenhouse industries, the Ontario Training Centre, and the forty-six industries not included in the report.

The industrial biochemical oxygen demand loading was attributed to three industries, Ammerican Motors (Canada) Limited, Brampton Poultry Company Limited, and Gerry Lewis Limited. The first of these discharged batches of wastes,while the other two had continuous daily wastes. Increased production at Brampton Poultry Company Limited in the next few years will increase its biochemical oxygen demand loading from that plant to approximately 400 pounds per day. This will increase the total industrial biochemical oxygen demand to 750 pounds per day.

Over ninety percent of the suspended solids loading was

Discussion (cont'd.)

discharged by the three industries mentioned above and the Brampton Optical Company Limited. The Optical Company is presently making improvements to their settling facilities, but it is doubtful that improved settling will produce an effluent suitable for discharge to a natural watercourse. With improved settling and without the use of coagulants, the waste may be acceptable for discharge to the sanitary sewerage system.

The automotive plant, the tannery, and Union Screen Plate Company of Canada Limited were the only sources of chromium in Brampton. All three discharged trivalent chromium. In addition, Union Screen Plate was a continuous source of hexavalent chromium, while American Motors dumped batches of waste containing chromic acid.

Other waste components were particular to only one industry in town and these components and the ones already mentioned are listed on the following table.

The table contains the waste constitutents from each industry calculated in pounds per day. With the exception of American Motors (Canada) Limited, each item in the table is a daily sewer loading. In the case of American Motors, the numbers in the table represent the maximum sewer loading based on the maximum number of batch discharges.

The total industrial waste flow, including the Ontario Training Centre and the Greenhouses, is as follows:

Discussion (cont'd.)

Flow	-	437,000 gallons per day
Biochemical Oxygen Demand	-	575 pounds per day
Suspended Solids	-	1,044 pounds per day
Total chromium	-	9.0 pounds per day
Hexavalent chromium	-	2.2 pounds per day
Copper	-	0.5 pounds per day
Iron	-	114 pounds per day
Zinc	-	0.16 pounds per day
Phenol	-	0.153 pounds per day
Fat	-	82 pounds per day
Sulphides (as H_2S)	-	53 pounds per day

Components of Industrial Wastes in the Town of Brampton Calculated in Pounds per Day

	Water Consumption (gpd)	Sewered Waste (gpd)	BOD	Susp. Solids	Chromium Total	Chromium Hex.	Zinc	Phenol	Iron	Fat	Sulphides	Copper
American Motors (Canada) Ltd. (1)	60,000	60,000	116	129	3.0	1.75	0.16	0.138				
Brampton Optical Co.Ltd.(2)	9,800	9,800		385					114			
Brampton Poultry Co.Ltd.	66,300	66,300	224	131						82		
Copeland-Chatterson Ltd.	5,600	5,600										
Dixie Cup (Canada) Ltd.	27,800	27,800										
Flexonics Corp. of Can.	8,800	8,800										
General Latex and Chemicals (Canada) Ltd.	3,400	3,400	9	5								
Gerry Lewis Limited	46,400	46,400	188	341	5.0						53	
Gummed Papers Limited	54,400	54,400	32	17				.015				
Iko Asphalt Roofing Products Ltd.	11,900	11,900										
Mosler-Taylor Safes (2)	9,200	9,200	1	3								
Page Bros. Products Ltd.	4,200	4,200		5								
Union Screen Plate Co. of Canada Ltd. (3)	11,500	11,500	5	28	0.99	0.46						0.46
Usher Plastics Ltd.	21,600	21,600										
Greenhouses	262,300	11,500(4)										
Ontario Training Centre	35,600	35,600										
Remaining Industries	50,200	49,000										
T O T A L	689,000	437,000	575	1,044	8.99	2.21	0.16	0.153	114	82	53	0.46

(1) includes the maximum number of batch discharges
(2) industrial waste discharged to a storm drain
(3) waste load included sanitary waste
(4) some of this sanitary waste discharged to septic tanks and tile beds

AMERICAN MOTORS (CANADA) LTD.
178 Kennedy Road South

This was a car assembly plant assembling 36 cars per day. Within the next year, production will increase to 48 cars per day, causing a corresponding increase in the number of plant employees and in the plant water consumption. The plant employed 400 people, 5 days per week, with most of these on the day shift. There was a small maintenance shift from 4:00 p.m. to midnight. This shift dumped, cleaned, and refilled process tanks, and effected a general clean-up in the production areas.

The continuous daily water consumption was estimated to be 44,700 gallons. In addition to this, an estimated 20,000 gallons per day was used by the 4:00 p.m. to midnight maintenance shift. This included nightly wash waters and periodic cleaning and recharging of process tanks.

Mr. M. E. LaForet, the Plant Engineer, and Mr. A. J. Trueman, Facilities Engineer, were interviewed.

PLANT OPERATIONS

The plant operations were mostly dry assembling. The wet processes of interest were, applying the bonderizing rust protective coating, painting, and leak testing the assembled bodies.

SOURCES OF WASTE

Bonderizing - This process consisted of completely immersing the partially assembled bodies in six separate tanks, each having a capacity of 7,000 gallons and equipped with drip trays. The first tank contained a caustic cleaner, and was dumped once every two months. The second tank contained a weaker caustic cleaner, and was also dumped every two months. The third was

a water rinse made slightly acidic to neutralize any carry-over of caustic from the cleaners, and equipped with steam coils. There was a two-gallons per minute overflow from this rinse tank, and the tank was dumped and cleaned weekly. The fourth tank contained zinc phosphate, and this solution was not dumped. When the tank needed cleaning, the sludge was pumped from the bottom of the tank to an overhead tank. The settled sludge from the overhead tank was removed for land dumping, and the supernatant was allowed to return to the zinc phosphate tank. The fifth tank was a recirculating spray rinse with a two-gallons per minute overflow. This tank was cleaned weekly. The sixth tank contained a weak chromic acid sealer, and was dumped and cleaned every two weeks. These six tanks were dumped, cleaned and recharged by the night maintenance crew, usually on Friday evening.

<u>Painting</u> - To finish the bodies, they were first dipped into an epoxy resin, up to the window level. The roofs and rocker panels were then sprayed. After baking, sanding, rinsing with deionized water and drying, the first colour coat was sprayed on, and the body was baked. Finally, the second colour coat was applied and baked. The spray painting was carried out in four water walled paint booths. Each of these contained 4,000 gallons of water which was totally recirculated, but dumped every two weeks. The booths were skimmed each night, and the sludge was land dumped. The floor area where the prime coat was sanded down was hosed clean each night.

<u>Leak Test</u> - The assembled bodies passed through a water spray to check for leaks. Approximately 200 gallons of water were used to test each car.

<u>Deionized Water</u> - The plant used 3,500 gallons per day of deionized water. This water was used in rinsing the cars after the prime coat had been sanded down, and in preparing the two caustic cleaning solutions and the chromic acid sealer used in the bonderizing process. The deionizer was regenerated every 6 days, after 21,000 gallons had been deionized, with muriatic acid and caustic soda. The waste from regenerating the deionizer was estimated at 2,000 gallons including rinse water.

<u>Cooling Water</u> - Welding machines throughout the plant consumed 250,000 gallons of cooling water daily. At the present time, this is totally recirculated, but the plant plans to install a continuous overflow and make-up to this system of approximately five gallons per minute. A compressor used 40 to 45 gallons per minute cooling water. This was discharged to a storm drain that entered a culvert on Kennedy Road.

<u>SAMPLING</u>

Since the continuous wastes from the plant were sanitary and cooling water, no continuous or composite samples were taken. Instead, grab samples were taken from the batch discharges. The following batch discharges were sampled:

In the bonderizing process	- #1 caustic cleaner
	- #2 caustic cleaner
	- #3 hot water rinse
	- #5 cold water spray rinse
	- #6 chromic acid sealer
In the painting process	- deionizer regenerating waste
	- paint booth

ESTIMATE OF WATER USE

(a) Continuous (day shift)

sanitary	-	12,000 gallons per day
compressor cooling	-	20,000 gallons per day
leak test	-	7,200 gallons per day
bonderizing overflow	-	2,000 gallons per day
deionized water	-	3,500 gallons per day

(b) Batch discharges (night shift)

#1 Caustic cleaner	-	7,000 gallons every 2 months
#2 Caustic cleaner	-	7,000 gallons every 2 months
#3 Hot water rinse	-	7,000 gallons every week
#5 Cold water rinse	-	7,000 gallons every week
#6 Chromic acid sealer	-	7,000 gallons every 2 weeks
4 paint booths	-	Each 4,000 gallons every 2 weeks
Deionizer regeneration	-	2,000 gallons every 6 days

Results - The analytical results of the analyses performed on the samples are attached at the end of this report.

WASTE LOAD

(a) Continuous Wastes (day shift)

The following table contains the waste loading from the continuous overflow of #3 and #5 bonderizing tanks. Each flow was 2 gallons per minute. With the exception of pH, the values are in lbs. per day.

	BOD	Suspended Solids	pH	Alkalinity	Zinc	Phenol
#3 tank	0.5	0.5	8.0	2.5	-	.00008
#5 tank	0.14	0.24	7.8	2.9	0.02	0
Total	0.64	0.74	-	5.4	0.02	.00008

(b) Batch Discharges

This table contains the waste load from batch discharges, calculated in lbs. per discharge with the exception of pH.

Source	Bonderizing Tanks #1*	#2*	#3	#5	#6	4 Paint Booths	Resin Regeneration
Volume (gallons)	7,000	7,000	7,000	7,000	7,000	16,000	2,000
Dumped every	2 mon.	2 mon.	week	week	2 wks.	2 wks.	6 days
BOD	35	17.5	3.5	1.0	2.1	56	0.16
Suspended solids	35	17.5	3.5	1.7	0.7	59	10.5
pH	9	-	8.0	7.8	3.5	9.0	6.0
Acidity	-	-	-	-	19	-	9
Alkalinity	140	70	18.9	20.3	-	544	-
Total chromium	-	-	-	-	3	-	-
Hexavalent chromium	-	-	-	-	1.75	-	-
Zinc	-	-	-	0.14	-	-	-
Phenol	.0056	.0028	.0006	.0	.0014	0.128	.0001

*Estimated concentrations

DISCUSSION

The continuous waste from the plant did not cause a problem in the municipal sewerage system. However, the batch discharges could cause operating problems at the sewage treatment plant.

The batch discharges usually occurred late Friday afternoon after 4 p.m. The minimum weekly discharge was 16,000 gallons, consisting of bonderizing tanks #3 and #5, and the waste from recharging the ion exchange resin.

If all the tanks were dumped, the volume discharged would be 53,000 gallons, but the usual discharges will vary between 30,000 and 40,000 gallons.

The concentrations of constituents in the waste varied depending on which tanks were dumped and cleaned. For the biochemical oxygen demand and suspended solids concentrations of the batch discharge to exceed those in strong sanitary sewage, either the paint booths or the caustic degreasing solutions would have to be dumped with no other tanks being discharged at the same time. This was not the case, since a rinse tank was always dumped when a strong waste was discharged.

The #5 rinse tank contained zinc and was dumped each week. Since at least two rinse tanks (#3 and #5) were dumped each week, and the tank contained two parts per million zinc, the concentration of zinc in the batch discharge would not reach 1 part per million.

The main source of phenol was the discharge from the paint booths which contained 800 parts per billion phenol. When the paint booths were drained, the phenol concentration in the slug of waste leaving the plant contained approximately 300 parts per billion phenol.

Chromium was discharged from the bonderizing tank #6 every other week. The batch discharge from the plant contained a minimum of 3 parts per million hexavalent chromium, and a maximum in the order of 8 parts per million.

<u>SUMMARY</u>

The hydraulic effect and the hexavalent chromium content of the batch discharges need revision so that they do not affect the operation of the sewage treatment plant. The hydraulic effect can be minimized by staggering the times of discharge or by draining tanks slowly so that the discharge takes several hours. The only method of reducing the chromium concentration is to chemically treat the waste from bonderizing tank #6 before discharging it.

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ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in ppm unless otherwise indicated

1 ppm = 1 mgm/litre
= 1 lb/100,000 Imp.Gals.

Municipality: Brampton

Report to: R. C. Stewart*

Source: American Motors

Date Sampled: May 26/61

Lab. No.	5-Day BOD	Solids Total	Solids Susp.	Solids Diss.	pH	Acidity as $CaCO_3$	Alkalinity as $CaCO_3$	Chrome as CR Total	Chrome as CR Hex.	Phenols in ppb	Zinc as Zn
T-545	340	4516	370	4146	9.0	--	3400	--	--	800	--
T-546	8	10162	526	9636	6.0	460	--	--	--	0	--
T-547	50	782	50	732	8.0	--	250	--	--	8	--
T-548	14	524	24	500	7.8	--	290	--	--	0	2
T-549	30	320	10	310	3.5	270	--	43	25	20	--

T-545 1 Grab of first colour spray booth

T-546 2 Grab of Ion exchanger Regeneration

T-547 3 Grab of #3 Bonderite Tank

T-548 4 Grab of #5 Bonderite Tank

T-549 5 Grab of #6 Bonderite Tank

BRAMPTON OPTICAL COMPANY LIMITED

11 George Street North

The plant produced optical lenses. Operations were steady throughout the year with the exception of a two week holiday shut-down. Fourty-two people were employed 5 days per week, 8½ hours per day. The verage daily water consumption was 9,800 gallons. Mr. B. Richel, the President, was interviewed.

PLANT OPERATIONS

After the lenses were cut to shape, they were ground with emery and polished with jeweller's rouge, a fine grade of ferric oxide. The polishing compound was $28-30^{\circ}$ Be, or approximately 150 pounds of rouge in 45 gallons of water. When the polishing was completed, the lenses were rinsed in a trough of water. The rinse troughs did not have water added to them during the day, but at the end of the daily production period, these troughs were drained, and the waste contained enough rouge to give it a density of 5°Bé.

WASTE DISPOSAL

The rouge wastes were carried by covered channels to a 1½ foot square pump sump inside the plant which was cleaned out once per week. The wastes were then pumped out of the plant to a settling basin 3 feet square with a settling depth of 22 inches, and which was cleaned once per week. The waste then flowed to a second basin of the same size which was cleaned twice per week. From the second outside sump, the wastes entered a storm drain that became an open ditch south and east of Gleneagle and Main Street South. The storm drain eventually discharged to the west branch of Etobicoke Creek.

SAMPLING

A composite sample covering a two hour period when the rinse troughs were being dumped, was taken from the final outside sump.

ANALYSES AND WASTE LOAD

The following table contains the analytical results and the estimated sewer loading based on the plant water consumption.

	ppm	lbs/day
Suspended solids	4460	385
Iron as Fe	1320	114

DISCUSSION

The effluent from the plant contained excessive amounts of suspended solids and iron due to the amount of waste rouge discharged. On the day samples were taken, the effective settling depth in the final basin had been reduced to 5 inches by solid material that had settled since the last clean-out. Effects of this waste stream were noticed where the storm drain was accessible at Gleneagle and Main St. on May 18, 1961. At that time, the waste in the storm drain contained 180 parts per million suspended solids and 24 parts per million iron (Fe). At the present time, the plant discharges more suspended solids than any other industry in Brampton. The plant is aware of its waste disposal problem, and action is now being taken to help correct it. The troughs and sump inside the plant are being baffled to increase the settling depth and the settling efficiency. The liquid level in the sumps outside the plant is 3 feet below ground level. Baffles will be placed on the effluent lines of these sumps to increase settling efficiency. As well as installing baffles, the plant

will remove the settled solids from troughs and sumps more frequently.

Should these measures not produce an effluent of acceptable quality, consideration could be given to treating the rouge waste in the rinsing troughs before it is discharged to the plant drains. Alum and activated silica have been effective in removing rouge from this type of waste at other similar plants.

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BRAMPTON POULTRY COMPANY LIMITED

32 Kennedy Road, South

The company killed and dressed approximately 13,000 chickens per day. The daily kill lasted from 7:30 a.m. to 2:30 p.m. From 2:30 p.m. to 6:00 p.m. the employees packaged chickens and effected a general wash-up. The night shift was composed of one man who washed the processing area and equipment. However, the main wash period occurred between 2:30 p.m. and 4:00 p.m.

At the present time, the plant employes 62 people, and consumes an average of 66,300 gallons of water daily. In the next three to four years, the company plans to double production which will produce a corresponding increase in water consumption, and will increase the number of employees to 80.

The following plant personnel were interviewed:

Mr. G. Gray, Manager

Mr. J. Coulter, Assistant Manager

Mr. D. McTaggart, Plant Superintendent

PLANT OPERATIONS

Receiving Room - After the chickens were received, they were weighed and hung by the feet on an overhead conveyor. The empty crates were rinsed and disinfected with formaldehyde. The floor in the receiving room became covered with dirt, a few feathers, etc., during the killing period. This material was shovelled up before the floor was hosed down.

Killing Room - The conveyor carried the birds into the killing room where they were first shocked, then killed with an electric knife. The chickens were then immersed in the hot scald tank, and dropped into the defeathering

machine. After being put on a second conveyor, the birds were singed, flayed with rotating rubber fingers to remove any remaining feathers or loose skin, and rinsed.

Eviscerating Room - Here a second conveyor carried the birds over a trough that had water flowing in it at approximately 70 gallons per minute. The removed viscera and heads were carried away by this trough. Other organs were vacuumed from the birds. The feet were finally cut off, and the chickens were placed in tanks and covered with ice to chill them.

The remaining plant operations, cutting and packaging, were essentially dry processes.

WASTE DISPOSAL

Sewers - The processing waste was discharged to the town sanitary sewer through two plant sewers, one from the old sump and one from a new sump. The old sump collected wastes from the floor drains in the receiving room, the killing room and the eviscerating room, while the new sump collected wastes from the floor drains in the waste room, the crate washer in the receiving room, and the trough from the eviscerating room. The effluent pipe from the new sump was covered with a fine mesh bronze screen.

Receiving Room - The crate washer spray rinsed the empty chicken crates. The water used in this washer was recirculated through a small settling tank but had a continuous overflow of two to three gallons per minute. This waste stream discharged to the new sump. The solids were shovelled out of the small settling tank, and the washer was cleaned each day during the 2:30 to 4:00 clean-up period. The material on the floor was shovelled up before

the floor was hosed down each day. These floor drains discharged to the old sump.

Killing Room - All wastes from the killing room entered the old sump through floor drains. Blood and rinse waters were discharged from the killing area. Feathers and rinse water from the defeathering machine fell onto a steel slide, and a rubber-fingered conveyor carried the feathers to the waste room where they were collected in drums and sent to the town dump. The rinse water flowed through the floor drains. Periodically during the day, feathers were swept away from the floor drains. Feathers were shovelled off the floor before the whole area was hosed down after the daily killing period. The hot scald tank was dumped and cleaned during the night shift.

Eviscerating Room - The wastes from this room were carried by a trough to an escalator-type mechanical screen where the solids were collected in drums to be sold. The effluent from the mechanical screen passed through a grease trap to the new sump.

The material vacuumed from the chicken body cavities was collected in drums and sold. The feet were also saved and sold.

Cooling water from a vacuum pump was discharged to the floor drains in the eviscerating room. There were also two ice-producing machines in this area. One was a Freon system with an air-cooled compressor, and the other was an ammonia system using a water-cooled compressor with total recirculation of the water. This cooling water, approximately 50 gallons, was dumped each week. Each day the ice bins were cleaned out, and the melted ice drained to eviscerating room floor drains.

SAMPLING

Composite samples were taken from both the new and old sumps. Equal portions were taken at half-hour intervals to collect 40 ounces of sample between 8:00 a.m. and 12 noon. The same procedure was used to collect samples covering the 1:00 p.m. to 4:00 p.m. period.

The waste flows remained fairly constant from start-up to 3:30 p.m. These flows were estimated at 75 gallons per minute to the new sump, and 55 gallons per minute to the old sump. After 3:30 p.m. the flows dropped to approximately 5 gallons per minute in each sump.

WASTE LOAD

The following table contains the analytical results of the analyses performed, and the sewer loading based on these analyses and the average daily water consumption.

		Old sump		New sump		Total
		a.m.	p.m.	a.m.	p.m.	
BOD	ppm	650	1,000	155	140	-
	lb/day	95	81	32	16	224
Suspended Solids						
	ppm	268	628	120	138	-
	lb/day	39	51	25	16	131
Fat						
	ppm	110	215	140	150	-
	lb/day	16	17	29	20	82
pH		7.0	6.9	7.2	7.2	-
Flow gallons per day		24,000		36,000		*66,300

* Includes sanitary water and wash water used on the night shift.

SUMMARY

In the past, the main problem connected with the wastes from this plant was the accumulation of feathers and viscera at the sewage treatment plant. Feathers must not be allowed to enter the sewerage system because a sewage plant does not remove them entirely. They either pass through the sewage treatment plant to the receiving stream, or accumulate in tanks or digesters from which they have to be pumped, where upon pumps become clogged.

While samples were being taken, no feathers were noticed in the new sump during the killing period. During the wash-up period a few feathers were noticed in the waste stream that originated in the Waste Room floor drains and the crate-washing machine. During the killing period, very few feathers were seen in the old sump, but feathers were noticeable during the wash-up period. Thus, feathers that reach the town sanitary sewers do so through the old sump. They enter the plant sewers mainly through the floor drains in the Receiving Room and Killing Room.

The mechanical screen effectively removed solids from the waste stream that passed through the new sump. This indicated in the analyses that show suspended solids of 120 to 138 parts per million. The effluent was screened again before discharge to the town sewers. The concentration of suspended solids in the old sump was higher than in the new sump, and were excessive in the afternoon when they reached 628 parts per million. This was due to the wash-up period in the afternoon when feathers reached the sump. Screens on floor drains were the only treatment for the waste flows to the old sump.

The biochemical oxygen demand in the new sump was not high, but in the old sump was 650 to 1,000 parts per million due to the discharge of blood with this waste.

The daily plant effluent had the following average composition:

BOD	-	374 ppm
Suspended solids	-	219 ppm
Fat (ether solubles	-	137 ppm

The recent installation of the mechanical screen (June 10, 1961) will prevent viscera from reaching the town sewers. However, the recent process changes will not eliminate the escape of feathers. Increased "housekeeping" in the areas of the killing and receiving room floor drains, especially during the wash-up period, will reduce the number of feathers being discharged to the town sewers.

COPELAND-CHATTERSON LIMITED
45 Railroad Street

This plant producing loose-leaf binders operated 5 days per week with 160 employees. The main operations were one shift per day with 6 employees working the second shift. The water consumption was steady throughout the year, except for the holiday shut-down, and averaged 5,600 gallons per day. Mr. D. W. Ewles, the Secretray-Treasurer, was interviewed.

PLANT OPERATIONS

The main operations were machining, forming and assembling loose-leaf binders, and printing and cutting paper to fit these binders.

The only operation producing industrial waste waters was a small nickel plating process used on some binder parts. This was a small and intermittent operation using an average of 800 gallons of water per day. The tanks in the plating room with their approximate capacities were as follows: hot caustic degreaser, 100 gallons; still hot water rinse, 50 gallons; phosphatizing solution, 40 gallons; nickel plating tank, 300 gallons; copper strike tank, 30 gallons; still cold water rinse, 30 gallons; and a running rinse tank. The caustic cleaner was dumped yearly. The two still rinse tanks and the overflow rinse tank were the only other sources of sewered wastes. The plating solutions were filtered and reused with the sludge being land dumped.

Plant Operations (cont'd.)

Painting binder parts produced no liquid wastes, however, a water walled paint booth may be installed in the future.

Rain water was used as boiler make-up whenever possible, but municipal water had to be used occasionally.

SUMMARY

The normal operation of the plant produced a negligible amount of industrial waste water. The only precautions necessary at the plant are to insure that plating or cleaning solutions are not discharged to the town sewerage system.

DIXIE CUP (CANADA) LIMITED
Queen Street West

The plant produced wax coated paper cups, 5 days per week, and employed 90 people on two shifts. The daily water consumption averaged 27,600 gallons. Mr. G. Camplin, the Plant Engineer, was interviewed.

PLANT OPERATIONS

The operations in the plant were printing, forming and wax coating the cups. The wax coating was sprayed onto the cups, and this operation used neither water nor produced sewered wastes. All the operations were dry although the printing presses were equipped with water cooled rolls.

SOURCES OF WASTE

The major sewered waste from the plant was cooling water used on a large compressor and a vacuum pump. This flow was continuous from 7 am to midnight, 5 days per week. On Friday afternoons, approximately twenty glue pots were washed. Since each of these pots had a capacity of approximately one quart, the waste from the washing operation was negligible.

Boiler water and domestic hot water were softened in an ion exchange unit which was regenerated with salt twice monthly.

SUMMARY

The wastes from this plant were uncontaminated cooling water, a negligible amount of wash water and waste from regenerating the ion exchange resin in the water softener. The large volume of cooling water could be segregated from the other plant wastes and discharged to a storm sewer or natural watercourse. This would help decrease the hydraulic loading in the municipal sewerage system.

FLEXONICS CORPORATION OF CANADA
Nelson Street West

This company had two plants in the town of Brampton for producing flexible tubing. The main plant employed 125 people, and operated 5 days per week, mainly 8 hours per day with a small second shift. The plant was located on Nelson Street West and used 7,400 gallons of water daily. The second plant was on McMurchy Avenue South and used to have a daily water consumption of 1,400 gallons per day. At the present time, this building is a storehouse, and one employee works in the building part-time, approximately 2 days per week, 5 hours per day. Mr. A. E. Beckley, the Plant Manager, was interviewed.

SOURCES OF WASTE

Most of the water used in the main plant was cooling water used on a vapour degreaser and four welding machines. The plant was installing a water cooled compressor. A large volume of water was used to test the finished tubes. Tanks were filled with water and the tubes, connected to a compressed air line, were placed in the tanks to test them for leaks.

The small plant had one welding machine and test tanks similar but smaller than those in the main plant. However, these were not used since all the operations were carried out at the main plant.

Sources of Waste (cont'd.)

The only processing at the second plant was a small and intermittent pickling or bright dipping operation. The acids used were sulphuric and nitric. These were not dumped but were trucked away when spent. When the process was in operation, perhaps 5 hours per week, rinse waters were discharged at approximately 3 gallons per minute.

SUMMARY

The main plant discharged cooling water and uncontaminated test water, while the small plant discharged a negligible amount of pickling rinse water to the municipal sewerage system. Should a large scale pickling operation be installed at the main plant, a pit would be dug behind the plant where pickling acids would be neutralized.

GENERAL LATEX AND CHEMICALS (CANADA) LIMITED
68 Eastern Avenue

This plant employing 15 people, prepared latex emulsions using natural and synthetic latex for producers of paints, textile coverings, floor covering materials and several others. The plant operated 5 days per week, 8 hours per day, and used an average of 3,400 gallons of water daily. Mr. J. C. Sturgeon, the Plant Superintendent, provided a tour of the plant, and the necessary information.

SOURCES OF WASTE

Cooling water was used on a grinder-mixer at the rate of 2 to 3 gallons per minute (approximately 1,000 gallons per day).

The major wastes were wash waters from cleaning the equipment used in preparing the latex emulsions. The wastes contained latex and additives used in the production of the emulsions. The plant used one-third natural latex and two-thirds synthetic styrene-butyl latex.

WASTE TREATMENT

Wash waters were collected in one of two tanks inside the plant. The tanks were wedge shaped and had a capacity of approximately 1,000 gallons each. The wastes were batch treated in these

Waste Treatment (cont'd.)

tanks, and usually one tank was dumped daily. When a tank was full, approximately five pounds of sulphuric acid was added to coagulate the latex, and the tank was then aerated to mix its contents. After settling for one hour, the latex was skimmed from the top and the water was pumped to settling tanks outside the plant. Before being discharged, the pH of the effluent was checked, and caustic was added if necessary.

Outside the plant, the waste entered a three-compartment settling tank, passed through three settling chambers in series, each 10 feet by 10 feet and 8 feet deep, to a sump that discharged to the city sewer. Each of these tanks had submerged effluent lines. The tanks were skimmed occasionally to remove floating material, and were pumped out once or twice each year by a septic tank cleaner. All skimmed material, collected either inside or outside the plant, was land dumped.

SAMPLING

A grab sample of the plant effluent from the final sump, which discharged directly to the city sewer, was taken.

SEWER LOADING

The following table contains the analytical results of the analyses performed, and the daily sewer loading based on the average plant water consumption of 3,400 gallons per day.

Sewer Loading (cont'd.)

Biochemical oxygen demand	- 250 parts per million	- 8.5 pounds per day
Suspended solids	- 142 parts per million	- 4.8 pounds per day
pH	- 7.4	-

SUMMARY

After primary treatment, the plant wastes were discharged to the town sewers. Treatment of this waste will cause no problem in the municipal sewerage system.

GERRY LEWIS LIMITED
McMurchy Avenue

This tannery produced a variety of chrome tanned and vegetable tanned leathers. The plant operated from 7:00 am to 5:00 pm, 5 days per week with 26 employees. Mr. E. Rylance, the Manager, was interviewed.

Two packs of hides, or 5,600 pounds, were processed daily, and the daily water consumption averaged 46,400 gallons. Flow estimates made while samples were being taken indicated maximum flows at 8:30 am and 4:00 pm of 160 gallons per minute, and a minimum flow from 10:30 am to 2:30 pm of less than 5 gallons per minute. This estimate revealed that the plant discharged approximately 27,000 gallons of waste between 7:00 am and 10:30 am, and 21,000 gallons between 2:30 pm and 5:00 pm. The total of these values agreed fairly closely to the plant metered water consumption.

PLANT PROCESSES

Dehairing - The hides, as received at the tannery, were placed in a paddle vat, and paddled with lime, sodium sulphide and sodium sulphydrate, for six to seven hours. This process dissolved the hair from the hide and removed dirt, dung, and soluble protein. One pack of hides (2,800 pounds) and 1,000 gallons of water were initially placed in each paddle. At the end of sevenhours, wash water was run into the paddle for

<u>Plant Processes</u> (cont'd.)

$1\frac{1}{2}$ hours. The hides were allowed to soak in this water overnight, and in the morning, they were again washed for another hour. The hides were then pulled from the paddle, and another pack of raw hides were put into the paddle.

<u>Fleshing</u> - After dehairing and rinsing,the hides were fleshed. The flesh was removed from the hides, and the hides were trimmed and cut to separate the sides, bellies and necks.

<u>Reliming</u> - Hides to be used to make moccasin leather were relimed by soaking them in a paddle containing a lime solution for eight days. During the eight days, the paddle was turned occasionally.

<u>Bating</u> - The hides were then placed in the bate paddle. The bate solution contained a pancreatic enzyme.

<u>Pickling</u> - Pickling was carried out in a paddle containing 1,000 gallons of a sulphuric acid and sodium chloride solution. This process reduced the pH of the hides by neutralizing the lime in preparation for the tanning process.

<u>Chrome Tanning</u> - After being pickled, the hides were put into the tan drums with the tanning liquor. When tanning was completed, the tanned hides were pulled from the drum and rinsed and neutralized with sodium bicarbonate in a second drum.

Plant Process (cont'd.)

Retanning - Approximately fifty percent of the chrome tanned hides were retanned with a natural vegetable tanning. When the retanning process was completed, the tanned hides were pulled from the tanning drum and washed in a second drum.

Fat Liquoring - The leather was then tumbled in a drum containing various oils. This operation impregnated the leather with oil to make it pliable.

Finishing - The finishing operations consisted of treating the surface with pigment, drying, waxing and buffing; all dry operations.

SOURCES OF WASTES

Dehairing - At the end of the seven-hour dehairing period, the paddle contained 1,000 gallons of waste containing lime, dirt, dung, soluble protein and hair. When wash water was added to the paddle, this waste was displaced to the precipitation tank. Since two packs of hides were processed per day, 2,000 gallons of this waste were pumped to the precipitation tank. Each afternoon, 100 pounds of sulphuric acid were added to this tank, and the contents were left to stand overnight. The next day, the liquid was drained from the tank, and the solids, which were mostly floating hair, were shovelled out for land dumping. The wash waters were not discharged to the precipitation tank.

Sources of Wastes (cont'd.)

Fleshing - Fleshing was a dry process, but the floor was hosed down occasionally, and this waste was discharged to the plant sump leading to the town sewer. The fleshings were shovelled into barrels and sold.

Reliming - Usually one reliming paddle was dumped each day. The waste was 1,000 gallons of lime solution, and it was discharged to the plant sewer.

Bating and Pickling - Each of the bating and pickling paddles contained 1,000 gallons of solution. One batch of each of these solutions was dumped approximately every three days.

Tanning - There were rinsing operations after both the chrome tanning and the vegetable tanning processes. After chrome tanning, there was also a neutralizing wash using sodium bicarbonate. Tanning liquor was not dumped.

WASTE TREATMENT

All industrial wastes from the plant, except drainage in the fleshing area and boiler blowdown, were collected in a sewer that passed under the boiler room. Here, a 10% polycide solution was continuously added to the waste flow at a rate of fifty drops per minute. Polycide was added seven days per week and twentyfour hours per day, and was an odour masking agent.

The plant sewer conducted the waste to a splitter box where the waste flow was divided between two cement settling basins operated in parallel. The effluent from the two primary settling tanks entered

Waste Treatment (cont'd.)

two secondary tanks, also operated in parallel. Each of these four tanks was made of cement, and was thirty feet square and five feet deep.

The effluent from the two secondary settling tanks entered a sump which also collected the waste from the fleshing area floor drain and the boiler blowdown. A calcium hypochlorite solution (HTH) was continuously dripped into the sump. Approximately 15 pounds of calcium hypochlorite was used per week.

All four settling tanks were cleaned out in March and September, and the two primary settling tanks were also cleaned in June and December.

SAMPLING

Composite samples of the waste entering and leaving the settling tanks were taken. Equal portions of the influent to the settling tanks were taken at half-hour intervals to collect forty ounces of waste from 7:00 am to 12:00 noon, and an additional forty ounces from 1:00 pm to 5:30 pm. The same method was used to sample the effluent from the settling tanks, including the fleshing floor drainage from 7:00 am to 12:00 noon and from 1:00 pm to 5:00 pm.

Grab samples were also taken from the following:

- dehairing paddle
- reliming paddle
- bate paddle
- pickle paddle
- chrome tan washing drum.

RESULTS

The analytical results are appended to this report.

WASTE LOAD

The following table contains the waste load from the tannery calculated (a) from grab samples taken inside the plant, (b) from a composite sample of the influent to the settling tanks, and (c) from a composite sample of the effluent from the settling tanks. All values, except pH, are reported in pounds per day.

Component	In-plant Samples	Influent to Settling tanks	Effluent from Settling tanks
Biochemical oxygen demand	105	135	188
Suspended solids	985	469	341
Sulphides	21.6	86	53
Total Chromium	2.5	11	5
Kjeldahl Nitrogen	64	42	32
Free Ammonia	21	14	7

SUMMARY

This plant was visited and sampled at the end of May, just before the two primary settling tanks were to be pumped out. At that time, one of the primary tanks was filled with settled material. This caused the waste stream to short circuit the settling tank. The other

Summary (cont'd.)

three tanks were approximately half full of settled solids. The plant hired a septic tank cleaner to pump out its settling basins, and since the cleaner charged for the volume of waste trucked away, the plant is considering having the settled solids removed from the settling basins more often. This would result in a lower level of settled solids in each tank, and would increase the settling efficiency at very little increased cost to the company.

Since the waste treatment facilities were revised in the fall of 1959, the plant has not received a complaint concerning either the odour of its waste effluent or odours from the tannery. The high pH of the waste stream, over 9, and the polycide and hypochlorite added to the wastes, all contributed to minimize the odour problem. While the tannery was being sampled, no disagreeable odours were noticed around the plant or in the sump that discharged to the town sewer.

The analyses indicated that the 5-day biochemical oxygen demand of the waste increased as the waste stream passed through the settling basins. This might be due to septic conditions in the settling basins which would convert part of the ultimate biochemical oxygen demand to a form detected by the 5-day test.

Since the strong wastes from the tannery were discharged in batches, a large error could have resulted in the sampling procedure. Samples were taken every half-hour, but slugs of strong waste could have passed the sampling points in the intervals between sampling. This is a

Summary (cont'd.)

possible explanation for the increase or decrease in the concentration of constituents as the wastes travelled from the plant to the town sewer. Settling basins have a levelling effect on batch discharges; thus composite samples of the effluent from the settling basins included the effects of batch discharges more so than in-plant samples or composite samples of the influent to the settling tanks.

Previous to this report, the tannery was last sampled in 1957 before the waste disposal facilities were improved. Results obtained in 1957, when compared to the results obtained during this investigation, indicated an eight-fold decrease in the biochemical oxygen demand of the tannery waste, while the suspended solids doubled and the sulphides and chromium concentrations also increased.

Continued supervision and inspection of the waste disposal facilities are necessary to keep odours under control, and to further decrease the biochemical oxygen demand and suspended solids in the plant effluent.

All analyses except pH reported
in ppm unless otherwise indicated

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

Municipality: Brampton
Source: Gerry Lewis Limited
Date Sampled: May 31, 1961 by: R.C.S.

Report to: R. C. Stewart

Lab. No.	5-day BOD	SOLIDS Total	SOLIDS Susp.	SOLIDS Diss.	pH	Acidity as $CaCO_3$	Alkalinity as $CaCO_3$	Sulphide as H_2S	Total Chrome as Cr	NITROGEN AS N Kjeldahl	NITROGEN AS N Free NH_3	NITROGEN AS N NO_2	NITROGEN AS N NO_3
T-585	260	3,926	460	3,466	9.2		340	72	2.5	53	14	0	0.08
T-586	150	3,704	264	3,440	4.3	250		85	40	25	9.5	0	0.16
T-587	125	2,914	200	2,714	8.5		380	77	6.	28	9	0	0.06
T-588	560	6,000	1,032	4,968	9.6		250	159	20	86	17	0	0.16
T-589	450	7,620	1,896	5,724	11.5		620	302	.2	170	56	0	0.24
T-590	3,900	66,428	47,282	19,146	12.3		9,400	1,060	0	2,550	560	0	3.5
T-591	1,040	5,496	652	4,844	9.0		920	40	0	740	510	0.5	0.32
T-592	710	74,860	960	73,900	1.8	2,450		0.1	0	480	380	0	0.36

T-585	1.	Plant effluent to town sewers (7 am - 12 noon)
T-586	2.	Plant wastes to settling basins (7 am - 12 noon)
T-587	3.	Plant effluent to town sewers - grab (9:00 am)
T-588	4.	Plant effluent to town sewers (1 pm - 5 pm)
T-589	5.	Plant wastes to settling basins (1 pm - 5:30 pm)
T-590	6.	Grab sample from dehairing paddle
T-591	7.	Grab sample from bating paddle
T-592	8.	Grab sample from pickling paddle

ONTARIO WATER RESOURCES COMMISSION

CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported
in ppm unless otherwise indicated

Municipality: Brampton
Source: Gerry Lewis Limited
Date Sampled: July 6, 1961 by: R.C.S.

Report to: R. C. Stewart

Lab. No.	5-day BOD	SOLIDS Total	SOLIDS Susp.	SOLIDS Diss.	pH	Alkalinity as $CaCO_3$	Total Chromium (Cr)	NITROGEN AS N NH_3	NITROGEN AS N Kjeldahl	NITROGEN AS N NO_2	NITROGEN AS N NO_3	Acidity as $CaCO_3$
T-754	21	7,558	7,340	218	4.3	-	250	11	23	0	traces	500
T-755	950	6,786	3,840	2,946	12.5	3,200	0.38	11	90	traces	traces	-

T-754 1. grab sample of chrome tan rinse

T-755 2. grab sample from relime paddle

GUMMED PAPERS LIMITED
12 Henderson Avenue

The plant produced gummed paper, aluminum foil coated paper and asphalt laminated paper. The production of asphalt building paper was seasonal,while production of the other products was fairly steady. The plant employed 125 people, and operated 24 hours per day, 5 days per week. The average daily water oonsumption was 54,400 gallons. Mr. D. Freeman, the assistant superintendent, was interviewed, and Mr. Fendley, the assistant millwright, provided a tour of the plant.

SOURCES OF WASTES

The plant was divided into three sections. One produced gummed papers, the second aluminum foils, and the third produced asphalt laminated papers.

Utilities - The plant was equipped with the usual boilers and ion exchange water softeners. There were also two compressors, and at least one of these operated continuously.

Gum - This section of the plant applied various glues to the paper. After applying the glue, the paper was air dried. The only water used in this section of the plant was for washing rollers, pails, containers, felts, etc. Beside the front gum machine there was a large sink that had a continuous overflow of two to three gallons per minute. Articles to be cleaned

Sources of Wastes (cont'd.)

were soaked and cleaned in this sink. There was another gum machine and similar washing area, but this was not operating on the day of the inspection.

Foil - Various types of foils were produced. Some were printed, some embossed, and some were paper backed. The winding rolls on four of the machines in this section were equipped with water cooled brakes. The only other use of water in this area was for washing rollers, containers, etc. The washing area had a continuous overflow of water, but the washing operations were not continuous. This overflow was estimated at two to three gallons per minute. Wastes from this section contained various lacquers, used for surface treating the paper, and glues, used to join the foil and its paper backing.

Asphalt - Asphalt laminated paper and asphalt coated paper were produced in this section of the plant. There were two machines and each had a water cooled roller used to cool the asphalt lamination or coating. The sewer serving this section of the plant was equipped with a catch basin to insure that, if an accidental spill of asphalt occurred, the asphalt would not reach the town sewer. No wash water was used in this section of the plant.

ESTIMATE OF WATER USAGE IN THE PLANT

Sanitary	-	4,000 gallons per day
Gum washing (front)	-	5,000 gallons per day
Gum washing	-	5,000 gallons per day
Foil washing	-	6,000 gallons per day
Asphalt cooling	-	15,000 gallons per day
Compressor Cooling	-	8,000 gallons per day
Foil brake cooling	-	8,000 gallons per day
Boiler feed, water softener	-	3,000 gallons per day
TOTAL	-	54,000 gallons per day

SAMPLING

The contaminated waste streams originated in the washing operations. These washing operations were very irregular, and occurred only when a container was emptied or a machine was changed to a different product. Compared to the cooling water discharged from the plant, the amount of wash water was small. For this reason, only the continuous waste flows were sampled. Grab samples of the asphalt cooling water, the front gum wash tank, and the foil area washing were taken. The asphalt cooling water sample included boiler blowdown.

RESULTS AND WASTE LOAD

The following table contains the analytical results of the analyses performed, and the sewer loading, based on these analyses and the estimated water used.

Results and Waste Load (cont'd.)

Waste Source	BOD		Suspended Solids		Phenol	
	ppm	lb/day	ppm	lb/day	ppb	lb/day
Asphalt cooling	34	6.1	50	9.0	4	.0007
Foil area wash water (1)	5	0.3	30	1.8	45	.0027
Front gum wash water (2)	500	25	116	5.8	220	.011
TOTAL	-	32	-	17	-	.015

(1) this was a minimum, because no washing occurred while the sample was being taken

(2) this was a maximum because washing was being carried on while the sample was taken. Washing was not a continuous operation

SUMMARY

The combined waste from this plant was calculated to contain the following concentrations of constituents for average daily conditions:

Biochemical oxygen demand	-	55 parts per million
Suspended solids	-	31 parts per million
Phenol	-	28 parts per billion

Much of the industrial waste discharged by this plant was uncontaminated cooling water. Some of this could be segregated for discharge to a natural watercourse in order to reduce the hydraulic loading on the municipal sewerage system.

IKO ASPHALT ROOFING PRODUCTS LIMITED
71 Orenda Road

Asphalt coated paper (felt) and roofing shingles were produced at this plant 5 days per week, 8 hours per day, with twenty employees. Production was slightly seasonal, but the average daily water consumption was 11,900 gallons. Mr. I. Koschitzky, the President, was interviewed.

SOURCES OF WASTE

Almost all the water consumed by the plant was cooling water used in the production of shingles. When shingles were not being produced, that is when the "felt" was being processed, no cooling water was used. The cooling water flowed through a roller used to cool the asphalted paper after the grit was applied, and before the shingles were cut to shape.

The only other use for water was to cool a compressor.

SUMMARY

The plant discharged only cooling water. Within the next year, increased production will cause a two or three-fold increase in the plant water consumption.

MOSLER-TAYLOR SAFES
263 Queen Street East

Safes for protection against theft and fire were produced by this plant. The plant employed 190 people, and operated 5 days per week, 8 hours per day, with a few employees on a second shift. The average plant water consumption was 9,200 gallons per day of which only the sanitary waste (5,700 gallons per day) was discharged to the city sewers. Mr. R. Castle, the Manager of Works, was interviewed.

PLANT OPERATIONS

Dry machining, forming, assembling, insulating with cement and refractory material, and spray painting were the plant operations.

WASTE DISPOSAL

Industrial wastes were discharged to two plant sewers that lead to a ditch south of the plant. This ditch was dug by the company and is on company property. It joins a natural watercourse that is a tributary of Etobicoke Creek.

The east sewer carried wastes from a drinking fountain, roof drainage, ground drainage from weeping tiles around the foundations of the building, and wash water used on the floor in the area where cement and refractory material were mixed and lined into the safes. The washing

Waste Disposal (cont'd.)

operation occurred late each afternoon. The west sewer contained cooling water from two compressors and two spot welders, waste from a degreasing operation where live steam was sprayed onto parts from a steam jenny, roof drainage, and the batch discharges of water from the water walled paint booths. There were two paint booths. One contained approximately 500 gallons of water, and the other approximately 1,000 gallons. Each paint booth was cleaned and dumped every two weeks, but the sludge was skimmed from each booth and land dumped every day.

WASTE FLOWS

During the sampling period, the east sewer had a flow of less than 1 gallon per minute, during the wash-up in the cement and refractory area the flow probably increased to 20-25 gallons per minute. The west sewer carried wastes at approximately 5 gallons per minute. This would increase when a paint booth was dumped.

SAMPLING

Composite samples, covering a two hour period, were taken from both outfalls. A grab sample was also taken from one paint booth.

RESULTS

The analytical results of the analyses performed on the samples are as follows. Values, except pH, are in parts per million.

Results (cont'd.)

	BOD	Suspended Solids	pH
water in paint booth	75	156	8.8
west outfall	2.8	28	7.6
east outfall	2.2	8	8.2

WASTE LOAD

The continuous wastes from the plant contained negligible amounts of biochemical oxygen demand and suspended solids. The batch discharges from the paint booths contained 1.2 pounds of biochemical oxygen demand and 2.4 pounds of suspended solids.

SUMMARY

The continuous waste from the plant was uncontaminated cooling water, roof and land drainage. The contaminated discharges were the weekly dumps from the paint booths and the daily wash water from floor washing in the cement and refractory preparation area. These floor washings have occasionally plugged the east sewer.

The area where the two plant sewers discharged was flat and the effluents spread out to cover an area of 200 square feet.

The area near the west outfall was coated with material from the discharge of the paint booths, and settled cement could be seen in the vicinity of the east outfall. However, 100 feet down the ditch

Summary (cont'd.)

from the outfalls, and well before the ditch reached the natural watercourse, no settled material was noticeable in the ditch.

At the present time, settleable solids do not reach the natural watercourse, but should the plant increase production, it will be necessary to dig a settling basin in the area where the plant sewers discharge to insure that settleable solids do not reach the creek.

RECOMMENDATIONS

Although the volume of waste discharged from the paint booths was small, it contained biochemical oxygen demand and suspended solids in concentrations in excess of those recommended for the discharge of wastes to natural watercourses. Dilution by other plant wastes was not sufficient to reduce these concentrations to the recommended limits. It is therefore recommended that the batch discharges from the paint booths be directed to the municipal sanitary sewers.

PAGE BROS. PRODUCTS LIMITED
Sheard Avenue

Soap was produced, and cleaners containing caustic and phosphates were compounded at this plant. The plant operated 5 days per week, 9 hours per day, with 8 employees. The daily water consumption did average 7,300 gallons, but since part of the plant had been closed down, the plant consumed approximately 5,700 gallons daily. Mr. J. Cotes was interviewed.

PLANT OPERATIONS

Soap was produced on an irregular basis with between zero and three batches produced per day. Each batch contained 500 gallons of water. Solid cleaners were also compounded.

The plant used to clean drums on a contract basis. This has been discontinued, and at the present time, they wash only returnable drums for their own use. This decreased operation caused the reduction in water consumption.

WASTES

The waste waters discharged to the town sewers were from washing equipment and drums. This waste contained only cleaning compounds.

SAMPLING

A grab sample of the wash water was taken from a small sump in the plant. The waste in this sump represented the total plant effluent.

RESULTS

The analytical results of the analyses performed on the sample are as follows:-

Suspended solids	-	130 parts per million
Alkalinity as $CaCO_3$	-	884 parts per million
pH	-	8.0

WASTE LOAD

Approximately 4,000 gallons per day of wash water was discharged from the plant. This waste contained 130 parts per million suspended solids, or 5.2 pounds of suspended solids were discharged to the sanitary sewer daily.

SUMMARY

The suspended solids discharged by this plant are not excessive, being approximately half the concentration of suspended solids in normal sanitary sewage. The only precautions necessary at this plant are to insure that strong caustic solutions are not discharged to the town sewerage system.

UNION SCREEN PLATE COMPANY OF CANADA LIMITED
24 Kennedy Road South

This plant plated large machinery parts. Although 90% of the work was chrome plating, copper and cadmium plating were performed. Since this plant was last investigated in June 1960, the plant water consumption had more than doubled and now averaged 11,500 gallons per day.

The company employed 12 people, and operated 18½ hours per day, and five days per week.

PLANT OPERATION

Preparation for Plating - The materials to be plated were large machinery parts. Some were new and some used. The new parts were only cleaned before plating. This operation consisted of wiping the part with a solvent soaked cloth, and then spray rinsing with water. Some of the used parts were machined, and some had the old plating stripped off before plating. When spent stripping acids, muriatic and phosphoric, were dumped, they were discharged slowly during the whole day, and no more than 25 gallons of 50% acid were dumped during any one day.

Plating - The various plating tanks had the following capacities:

Plant Operation (cont'd.)

Chrome tanks	-	4 tanks with a total capacity of 5,400 gallons
Cadmium tanks	-	2 tanks with a total capacity of 600 gallons
Copper tanks	-	4 tanks with a total capacity of 950 gallons

Since the plant began operating in 1957, no make-up chemicals have been added to any of the plating tanks, with the exception of the chrome tanks.

The plating tanks contained coils that carried either cooling water or steam, but usually carried steam. The condensed steam or cooling water drained through the running rinse tank to the pit below the plating tanks, and then to the sanitary sewer on Kennedy Road.

Fumes were removed from the edges of the chrome tanks to a plenum chamber that ran the length of the building. Fans drew the fumes from the plenum and vented them outside the plant. There were no connections between the plenum chamber andthe plant sewer.

Rinsing - After plating, the parts were raised out of the plating tank and spray rinsed. This initial rinse water was allowed to fall back into the plating tank as make-up water. The parts were then moved from overtop the tanks and rinsed thoroughly. This rinse water drained through the pit to the sanitary sewer, and contained varying amounts of chromic acid, depending on the shape of the parts being plated. The carry-over would be greater when hollow rolls were being plated.

Plant Operation (cont'd.)

Running Rinse Tank - This tank was used occasionally for rinsing plated parts. The influent to this tank was cooling water from a vapour degreaser and hot water overflow from the dewaxing tank. The dewaxing tank contained hot water used to melt wax off plated parts. The wax was originally applied to the machinery parts on areas where plating was not desired. The effluent from the running rinse tank discharged to the pit.

PREVENTION OF SLUG DISCHARGES OF CHROMIUM PLATING SOLUTIONS

The chrome plating tanks were not connected to the plant drains. The only way a slug of chromic acid could be discharged from a plating tank would be to overflow a tank while adding make-up water. If this occurred, the overflow would enter the fume removal ducts and be collected in the plenum chamber. The slug of chromic acid would remain in the plenum until the plant decided to chemically treat, land dump or bleed it slowly to the sanitary sewer.

SAMPLING

All plant wastes,including sanitary waste, were discharged through one plant sewer to the town sanitary sewer on Kennedy Road. A composite sample was taken from the plant sewer. Equal portions were collected every twenty minutes to obtain a forty ounce sample, from 9:00 am to noon.

RESULTS

The following table contains the results of the analyses and the daily sewer load based on these results and the average water consumption of 11,500 gallons per day. The pH value is not recorded in parts per million.

Component	Concentration (ppm)	Sewer Loading (pounds per day)
Biochemical oxygen demand	40	4.6
Suspended solids	246	28
pH	3.3	-
Copper	4.0	0.46
Cyanide	0	0
Chromium - total	8.6	0.99
hexavalent	4.0	0.46
Acidity	150	17

SUMMARY

Since this plant was last investigated, changes have been made that eliminated the chance of a slug of chromium plating solutions being discharged directly to the municipal sewers. Also, since June 1960, the concentration of hexavalent chromium in the effluent has been reduced from 12.5 parts per million to 4 parts per million, while copper has increased from 1.5 to 4 parts per million.

<u>Summary</u> (cont'd.)

The process procedures and supervision that affected a reduction in the hexavalent chromium concentration must be continued, and similar measures to reduce the amount of copper being discharged should be undertaken.

The pH of the waste stream was low, below the limit recommended for discharge to municipal sewers, and could easily cause a corrosion problem in the plant and town sewers. The low pH was caused by the discharge of waste stripping acids. Since the volume of stripping acids was small, they could easily be land dumped to prevent the corrosion problem.

USHER PLASTICS LIMITED
106 Nelson venue West

The plant operated 5 days per week, 16 hours per day with 50 employees. The daily water consumption averaged 21,600 gallons. Mr. J. Mills, the Technical Superintendent, was interviewed.

PLANT OPERATIONS

The plant contained five extruding machines in which polyethylene and polyvinyl chloride were extruded to form clothes-lines, hose and weather stripping. Some dry compounding of raw materials was carried out, but not all the material extruded was compounded in the plant.

SOURCES OF WASTE

The only waste from the plant was cooling water used to cool the extruded plastic. Each of the five extruders used cooling water, and the waste water from one of them was discharged to a storm sewer, while the other four discharged to the sanitary sewer.

SUMMARY

The plant discharged only cooling water to the town sewerage system. This cooling water could be discharged to a storm drain.

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